

Programming Project Report

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Academic Integrity Statement: I pledge that I have neither given nor received unauthorized help on this programming assignment.

Problem Statement:

This assignment builds off of the last homework assignment by adding the ability to compute sine, cosine, and tangent functions as well as giving the minimum and maximum of two numbers. Another ability that was added was being able to save mathematical expressions to variables. The inputs are the same as the last assignment where the user inputs a mathematical expression with spaces between each number or operator. The program will output the answer to the mathematical expression that the user typed in. Error handling was used to make sure that the stack is not empty or if you cannot pop from the stack.

Design:

The design for this assignment is same as the last assignment but more polished. In the midpoint assignment separate functions were used to check if the expression had an operator, used trig functions, or was a max or min function. Now there are only two functions for if it is an operator or max and min (binary operator) or was a trig function (unary function). This assignment uses the same structures as the last with the addition of the map class that was made in class. Implementing the ability for the user to use trig functions and max and min functions was easy. All that was needed was to add two functions to check if the expression is a trig function and a way to solve the trig functions. Some pros to this approach are that it organizes the code better. No cons come to mind.

Implementation:

The implementation process for this assignment is the same as the last one. No sample code was given except the solution from the last assignment that we could use at our leisure. The code was expanded upon by adding the user to input trig functions and find the min and max of two numbers. Another ability that was added was being able to save numbers or functions to variables. Development time for this assignment took the full two weeks.

Testing:

Testing was done the same as before by inputting mathematical equations into the program and seeing what the result was. Along with the basic $2 + 2$ equation $\sin 2$, $\min 5$, $\max 3$, 5 , $x = 2 + 2$, and $2 * x$ were also tested. Unlike on the last assignment where if the user's input was missing the closing parenthesis that it would show it in the postfix this program does not do that. Special cases that were tested were $(3 + 5, 5 + 3)$, $\sin(2)$, and $(x = 3)$. Among those special cases $(x = 3)$ was the only one that resulted in any sort of error or crash. A picture of the program's output is shown below.

Conclusions:

I would label this assignment a success. If I were given more time to work on this assignment I would have liked to use the standard C++ libraries instead of the classes that were designed in class just to say I have experience with them. This assignment took the full two weeks to complete.

C:\WINDOWS\system32\cmd.exe

```
Enter a mathematical expression (press q to quit): ( 3 + 5
Mismatched parentheses!
Enter a mathematical expression (press q to quit): 5 + 3 )
Mismatched parentheses!
Enter a mathematical expression (press q to quit): sin ( 2 )
0.909297
Enter a mathematical expression (press q to quit): ( x = 3 )
Press any key to continue . . .
```